Stantec

Lumberton Loop Feasibility Study

City of Lumberton North Carolina

October 2024

Integrated Mobility Division
N.C. DEPARTMENT OF TRANSPORTATION

LANE

City of LUMBERTON North Carolina

Acknowledgments

This feasibility study was prepared by Stantec for the City of Lumberton, North Carolina through the North Carolina Department of Transportation - Integrated Mobility Division (IMD) Feasibility Studies Program. Special thanks to the members of the project team that participated in the development of this Plan:

City of Lumberton

- Brandon Love
- Wayne Horne
- Sarah Beth Ward
- Artriel Krichner
- Rob Armstrong

North Carolina State Coastal Dynamics Design Lab

- Travis Klondike
- Andrew Fox
- Leslie Bertlebaugh

North Carolina Department of Transportation

- Joe Furstenburg (IMD)
- Kim Nguyen (IMD)
- Darius Sturdivant
- Sean Matuzewski
- Christy Huff
- Steve Kendall
- Josh Shang
- Brian Mayhew

Stantec Team

- Timothy Tresohlavy
- Dan Hemme
- Scott Lane, JS Lane

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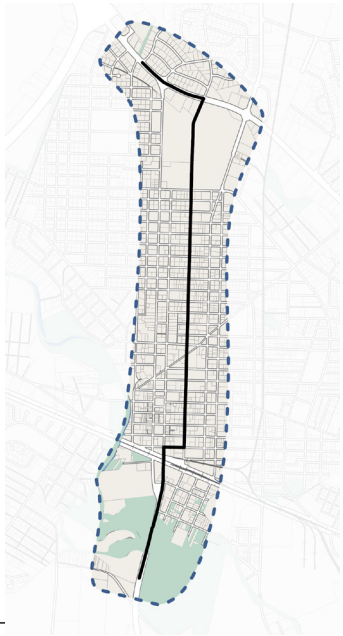
PROJECT SUMMARY

This project examined the on-road segments of a planned community trail (Lumberton Loop).



The project team analyzed the benefits, challenges, and potential costs of the project. This feasibility study was conducted to estimate planning-level construction costs.

We examined data.

The project team analyzed the following to find the best location for the future trail:

- Flood risk
- Existing sidewalks and crosswalks
- Land use
- The location of utility poles
- Crash data and safety hazards

We spoke to the community.

Through surveys, stakeholder meetings, outreach events, and an interactive map, we learned:

- Crossing Roberts Avenue (NC 211) is the main obstacle at the north end of the corridor
- The community supports the project's effort to stay within the existing publically owned land (right-of-way)
- The community is open to traffic calming strategies to encourage drivers to slow down

We chose Walnut Street as the best alternative.

The project team examined Elm St, Walnut St, Fayetteville St, Elizabethtown Rd, and Elm/Chestnut St as possible places for the trail. **The project team chose Walnut Street because it has the most potential to:**

- Accomodate walking and biking
- Improve safety
- Cooridinate with other projects
- Align with Giles Park
- Minimize the need to buy property
- Minimize the need to lay more pavement

We chose different multimodal treatments, depending on site context.

Some segments will be a shared-use path, while other segments will combine a sidewalk with shared lane markings.

The recommended route follows Walnut Street (behind Biggs Mall), Second Street (NC 72) in Downtown, and S Chestnut Street heading south of downtown toward the Lumber River Levee Trail. This alignment maximizes multimodal benefits while minimizing the potential impact to property owners.

Estimated planning-level costs have been prepared for each of the five segments, to be constructed in phases.

1 INTRODUCTION

Overview & Study Goals

After the City of Lumberton was devastated by rainfall and flooding from Hurricane Matthew (2016) and Florence (2018), leadership responded with a comprehensive plan, in cooperation with the NC State University Coastal Dynamics Lab, that addresses its flood risk properties and adds policy that will guide future redevelopment decisions. The Lumberton Loop concept was initially described and documented within the Lumberton Floodprint (2019) Plan, and further refined by the Lumberton Community Floodprint Phase Two (2020) Plan, which are both valuable resources that preceded this feasibility study.

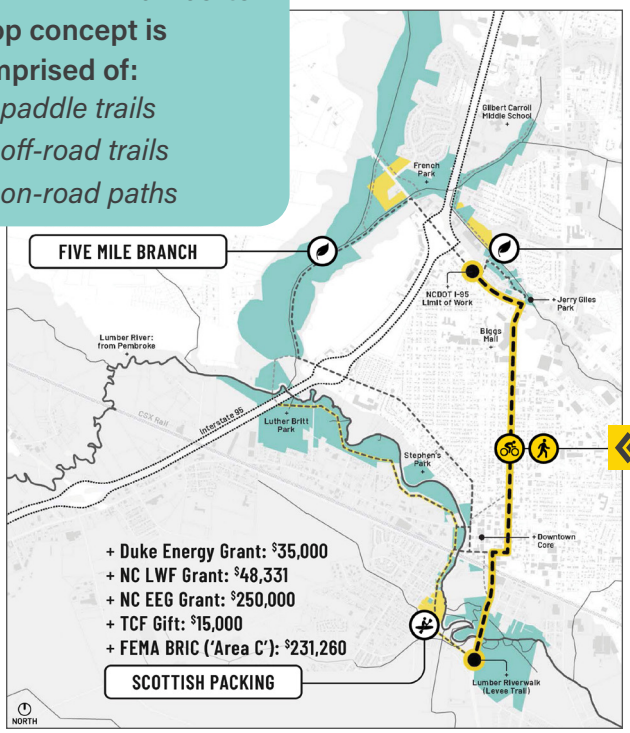
The vision for the Lumberton Loop can be described as a community trail that connects its residential neighborhoods with a larger network of walking, biking, and paddling opportunities, in addition to new park spaces and stormwater infrastructure. In January 2023, City staff sought grant assistance from the North Carolina Department of Transportation (NCDOT) – Integrated Mobility Division (IMD) for a planning-level feasibility study of the roadside portions of this proposed segment. Stantec Consulting Services Inc. was selected to facilitate this multimodal planning study, and provide conceptual design treatments that are safe, efficient, cost-effective, and implementable.

Background & Site History

The Lumberton Loop is a planned citywide trail network that will connect Lumberton's residents to riverine ecosystems, restored streams, constructed wetlands, and recreational facilities. Lumberton has large sections of natural land for flood protection, and the Lumberton Loop will help residents access and utilize these natural areas. The proposed trail is completely within Lumberton, and more than 1/3 of Lumberton's residents are within a five-minute walk of the Lumberton Loop.

The ENTIRE Lumberton Loop concept is comprised of:

- *paddle trails*
- *off-road trails*
- *on-road paths*



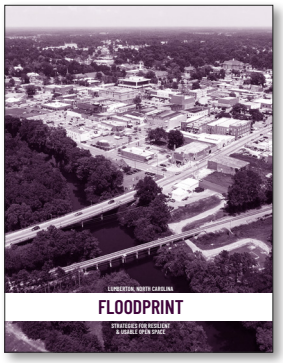
Lumberton floodprint concept for the "Lumberton Loop".

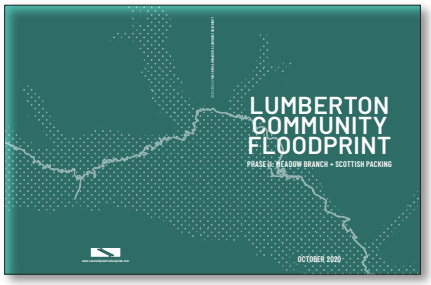
THIS planning-level Feasibility Study analyzes an important segment of this proposed trail — 2.7 miles of the entire 8.5 miles. This feasibility study follows existing roadways and requires safety interventions for pedestrians and bicyclists at intersections, where potential conflict points are most prevalent.

Purpose and Need

This segment of the Lumberton Loop connects with existing and planned pedestrian facilities along Roberts Avenue (NC 211) near Jerry Giles Park to the Lumber Riverwalk / Levee Trail access point further south. It will connect downtown, adjacent residential neighborhoods, businesses, and other recreation opportunities.

The Lumberton Loop is part of the Community Floodprint plans, completed in 2020, and connects the community to outdoor recreation places that reduce flood risk. The loop will help Lumberton residents enjoy the outdoors while making the city more resilient to flood hazards.





▲ Click the images above to read each plan. ▲

The completed Lumberton Loop is intended to:

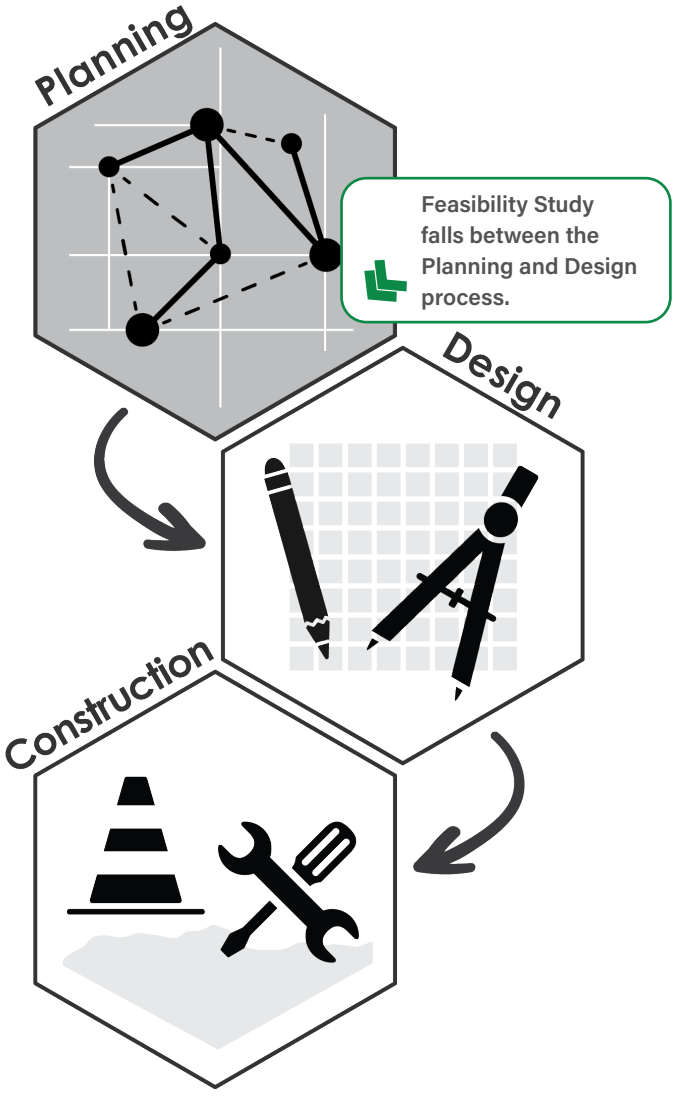
- Improve safety
- Connect the broader Lumberton Loop with downtown
- Improve transportation options for disadvantaged community members
- Reduce flood risk in Lumberton

What is a Feasibility Study?

Feasibility studies fall between conceptual planning and engineering design work. A feasibility study often analyzes alternative options for a potential project, and uses community feedback to identify a preferred alternative. By reviewing trail alternatives early in the planning process, we expect to identify and document site constraints or unique challenges that can be avoided or minimized, saving time and money on the future engineering design work.

A feasibility study answers questions such as: What side of the road will the trail be located? Where (or how) will the trail cross the road? How do we best avoid utilities along the trail?

In a feasibility study, the project team will solicit feedback from the local community and stakeholders. The team combines this feedback with their technical knowledge and best practices to inform decisions about how the Lumberton Loop trail should be aligned with other improvement projects.



Process & Schedule

This Lumberton Loop feasibility study started in July 2023 and concluded in June 2024. The study was divided into phases.

Summer 2023

LISTENING

The project team collected feedback from the community and reviewed existing data, resources, concurrent planning efforts, and performed field work.

Fall / Winter 2023-24

TESTING

The project team considered alternative strategies to evaluate the most appropriate and least impactful.

Fall / Winter 2023-24

REFINING

The project team filled in details about the alternative designs with additional stakeholder collaboration and discussion.

Spring 2024

DOCUMENTING

The project team synthesized this information in one document, creating the final study that you are reading now.

Plan & Policy Review

The City of Lumberton, Lumber River RPO, and Robeson County have already done the hard work of outlining how they would like the community to grow and prepare for future flood risk. To stay consistent with these efforts, we conducted a plan review of documents and studies early in this process:

- Lumberton Pedestrian Safety Study (2022)
- Comprehensive Plan: Robeson County, NC (2022)
- Lumberton Downtown Design Overlay District (2021)
- Lumberton Community Floodprint Phase 2 (2020)
- Lumberton Community Floodprint (2019)
- Lumberton Recovery Plan (2018)
- Lumberton Downtown Master Plan (2017)
- Lumberton Comprehensive Plan (2016)
- Lumberton Tomorrow Land Use Plan (2015)

Through these plans, Lumberton has decided to connect historically underserved areas where there is a significant gap in pedestrian and trail connectivity. The proposed Lumberton Loop trail seeks to mend this gap, improve connectivity, improve access to parks, and improve access for an underserved part of Lumberton.

Lumberton has planned to create a greenway system that uses the Lumber River. The goal of this greenway system is to connect downtown with the river and to be a linear park. This greenway will provide people with a pleasant walking experience, educational opportunities, and utilize flood-prone lands for passive recreation.

This feasibility study is aligned with previous plans because it will enhance connectivity, ADA accessibility to existing parks, and improve access to the river. The proposed study corridor itself will close the gap in the Lumberton Loop by connecting directly to the Lumber Riverwalk.

EXISTING & COMMITTED PROJECTS

The proposed Lumberton Loop trail is one of several concurrent projects in Lumberton. The most notable projects are listed here, with information on why they complement the Lumberton Loop.

I-95 widening and interchange improvements (I-6064; I-5879): Reconstructing interchanges at Carthage Road (Exit 19), and Roberts Avenue (Exit 20). Improving pedestrian facilities along new bridges over I-95, and along Roberts Ave (NC 211).

Fayetteville Road improvements (U-5797): Widen to add median and roundabout at Godwin Avenue. May benefit walkability along Walnut Street corridor with fewer cars.

Second Street / NC 72 complete streets redesign (HO-0014): Improving safety, traffic flow, signal operation, and multimodal facilities along 2nd Street through Downtown Lumberton. This design project will provide pedestrian safety improvements at key intersections, including three that connect with the Lumberton Loop segments under study.

Lumber River bridge replacement projects (B-5985AB): In coordination with HO-0014 project, two bridges over the Lumber River are being replaced along 2nd Street and 5th Street. New bridges will include pedestrian and bicycle facilities.

RAISE grant for signalized intersection and pedestrian safety improvements (various): Coordinated with dozens of communities in North Carolina, this RAISE grant project titled **"Walk NC"** (https://connect.ncdot.gov/resources/safety/SafeLumbertonDocuments/SAFELumHiRz.pdf), will upgrade existing intersections with pedestrian facilities, such as countdown signal heads, marked crosswalks, and improved accessible routes (ADA ramps and sidewalks). There are approximately 15 intersection locations within Lumberton that are included.

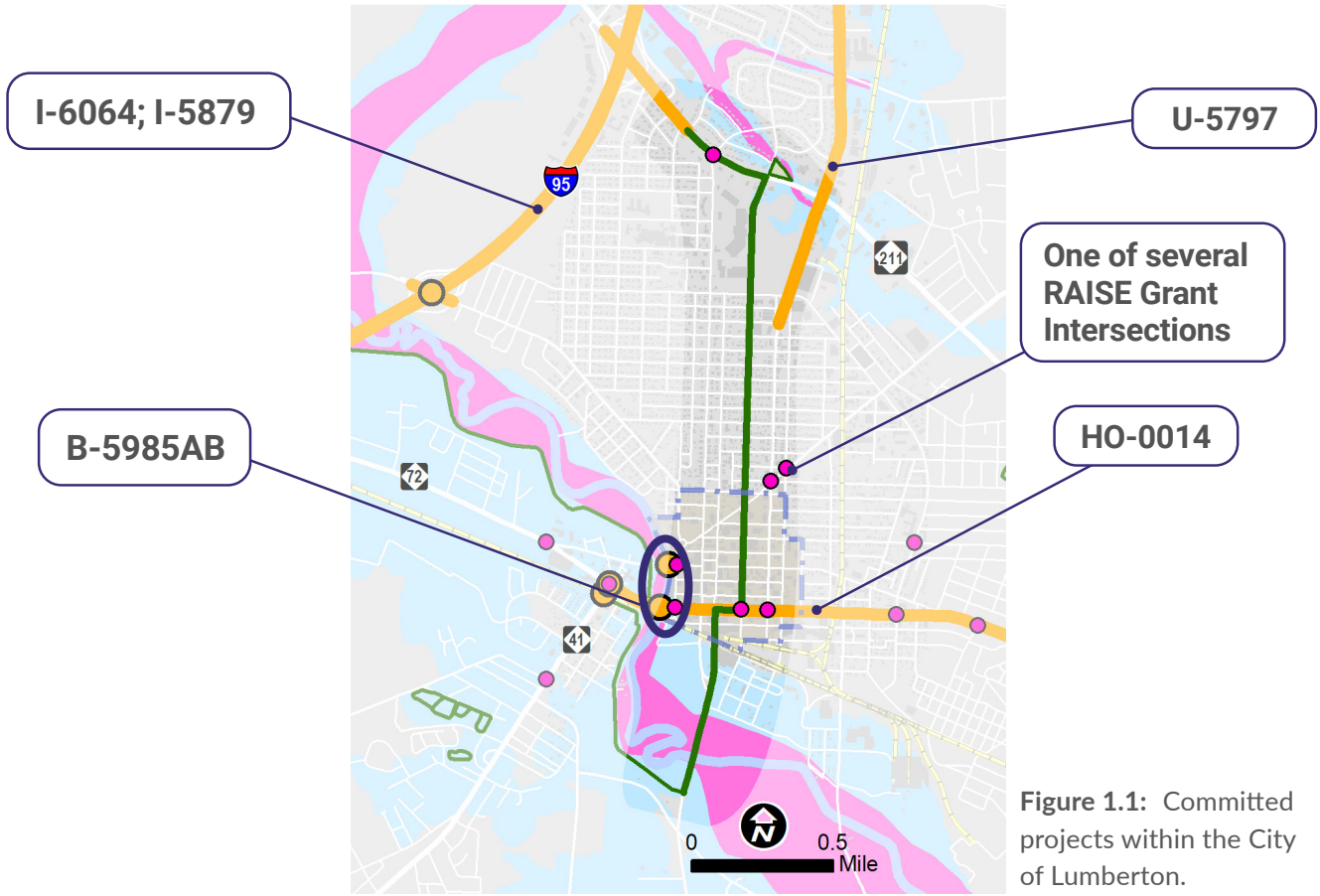


Figure 1.1: Committed projects within the City of Lumberton.

Project Benefits

The Lumberton Loop will provide many benefits to residents, visitors, and businesses. Some of these include:

Better connection to nature.

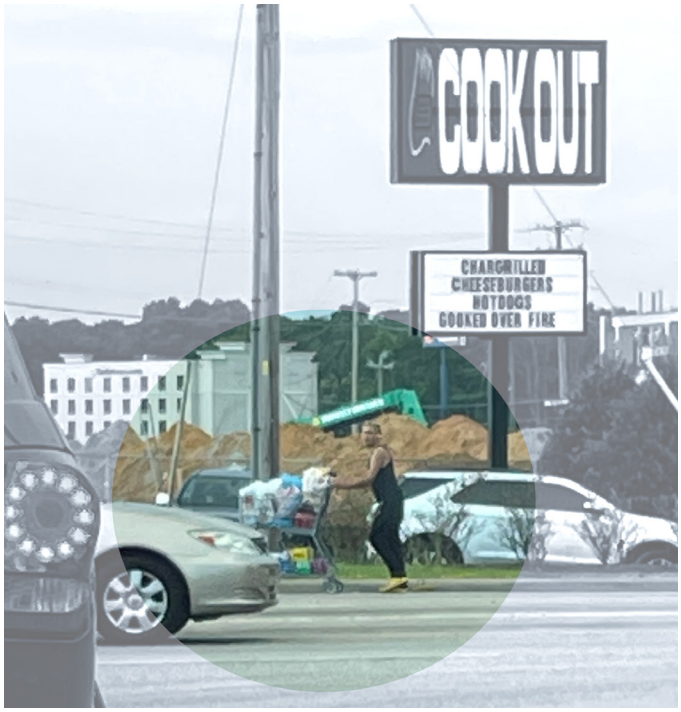
The Lumber River Levee Trail has few points of access currently, and residential neighborhoods are disconnected from trail heads. The existing levee trail is a wonderful place to experience nature, and this feasibility study will make it easier for people to connect with nature.

« Lumber River Levee Trail offers a destination for connectivity, with opportunity for enhancement through amenities.

Safer walking and biking.

Crossing Roberts Avenue (NC 211) or 2nd Street (NC 72) is challenging because many of these intersections are lacking marked crosswalks, accessible sidewalks, or adequate pedestrian infrastructure. Spot improvements are planned through other transportation projects; however, this feasibility study is the only comprehensive study of the entire corridor and its many intersection crossings that need improvement.

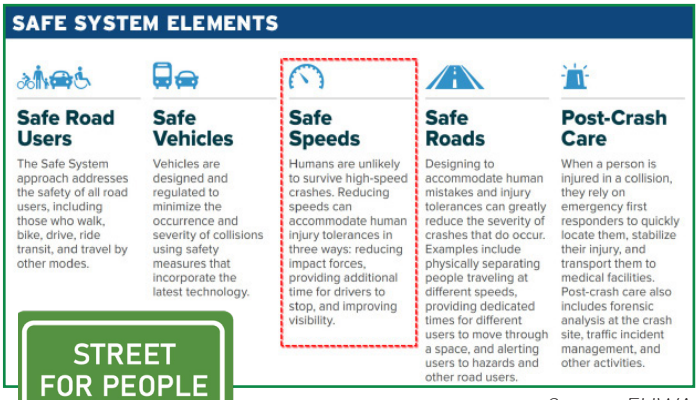
« Current unmarked intersection (top) and an example bicycle/pedestrian friendly intersection (left).



A more accessible Lumberton.

Our study area is within a five-minute walk to more than one-third of Lumberton's residents. Many of these neighborhoods have higher rates of poverty, higher rates of zero-car households, and are considered transportation disadvantaged. These segments will provide a multimodal transportation connection between these neighborhoods and the larger network of greenway trails and park amenities.

This feasibility study will examine potential connections, including to Jerry Giles Park, and make a safer environemnt for travel to grocery and essential resources (current hazardous conditions, seen to left) for the transportation disadvantaged community.



Source: FHWA.

Reduced speeding.

Extending the Lumberton Loop through along Walnut Street and through downtown represents a great opportunity to improve the street and intersections. Our strategy is to reduce the speed of vehicles to 25 mph or below, and allow this residential street to be more walk- and bike-friendly.

Following *FHWA's Safe System Approach*, lowering speeds increases safety for bicyclists and pedestrians.

2 EXISTING CONDITIONS

Study Considerations

Lumberton's existing conditions are the foundation of this feasibility study. To accurately determine the benefits, challenges, and probable costs, this study started with current conditions.

The next sections summarize environmental, built infrastructure, and transportation-specific challenges and potential site constraints. Field observations and photos were obtained in September 2023.

ENVIRONMENTAL CONTEXT

It is easiest to build sidewalks or sidepaths within areas that are already publicly owned (i.e., the existing public right-of-way). Roberts Avenue (NC 72) has a sufficiently large right-of-way (ROW) of approximately 150' to accommodate new pedestrian facilities. Walnut Street has approximately 54' of ROW, much of it existing pavement, leaving approximately 12' above the curb for sidewalks and utilities (both sides) that share a boundary with residential fences, driveways, and landscaping. This feasibility study does not anticipate negatively impacting private property or the existing floodplain.

LAND OWNERSHIP AND NATURAL RESOURCES

Walnut Street Corridor, residential.

South of Downtown Lumberton the flood hazard risk is higher, as our corridor crosses over the Lumber River bridge

Note: The larger goal of this feasibility study is to connect community parks with a non-motorized path, and utilize the exiting public right-of-way. The potential flood risk to this path is anticipated to be very low.

Meadow Branch vicinity experiences flood hazards, described in Floodprint plan(s)

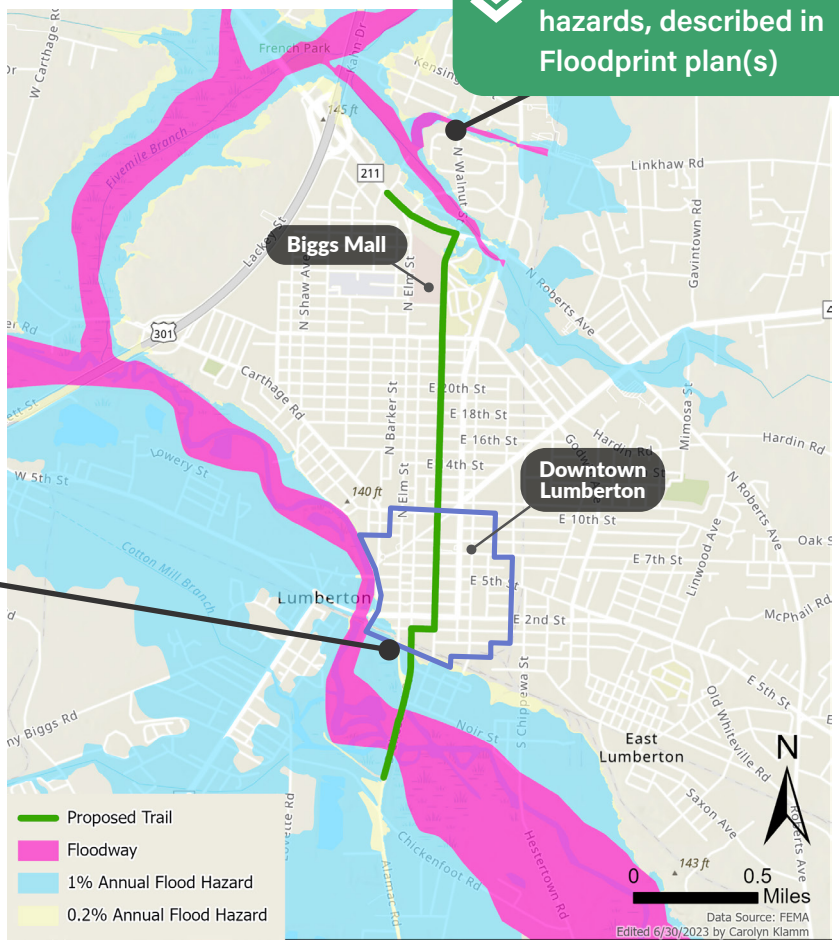


Figure 2.1: Flood hazards in relation with the proposed Lumberton Loop Feasibility Study Trail.

BUILT CONTEXT

The built context includes human-made infrastructure that already connects communities. This includes physical connections, such as roads, sidewalks, utilities, and social connections such as key destinations, like parks, open spaces, and businesses.

EXISTING PEDESTRIAN FACILITIES

Within downtown, there are more privately owned developments built directly along the existing ROW line. Fortunately, sidewalks already exist along both sides of Walnut Street within downtown, and the potential impact to adjacent properties would be minimal, if any.

« Downtown Plaza, with public parking and food trucks immediately behind the sidewalk.

Walnut Street corridor with existing businesses immediately behind the sidewalk. »

« Chestnut Street lined with brick paved sidewalks, providing a path for pedestrians.

LAND USE

The proposed route will reach many kinds of land use(s), notably the residential neighborhoods north of downtown and Meadow Branch (along Roberts Avenue). The Lumberton Loop trail will improve safety and pedestrian connectivity between work, home, and leisure.

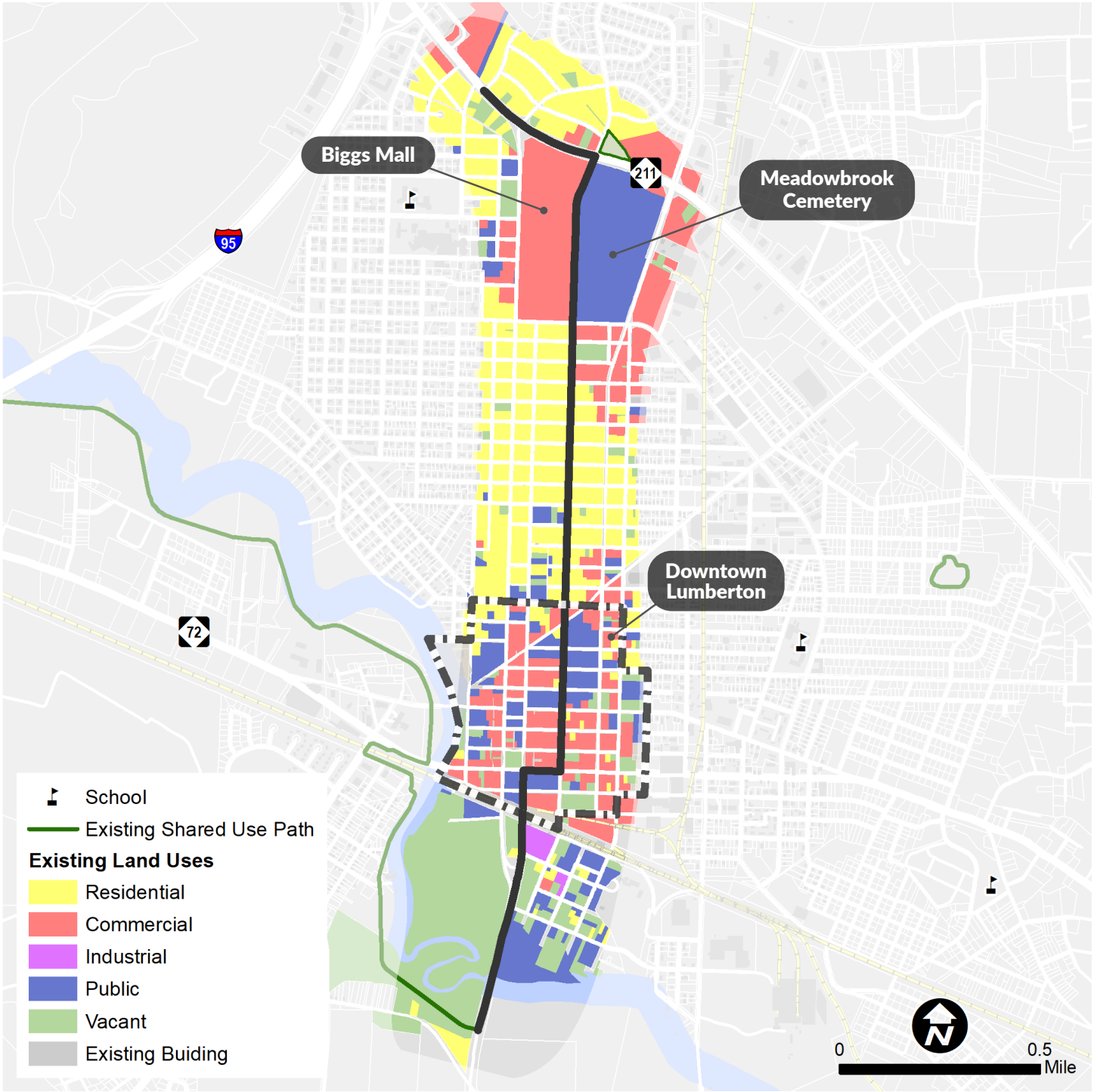


Figure 2.2: Existing land uses.
Source: Land use data from Downtown Master Plan Study.

UTILITIES & RIGHTS-OF-WAY

Some overhead utilities (such as power lines) make it difficult to place sidewalks or street trees. These same utilities are not always a challenge to overcome—they can also make it easier to add pedestrian signals at intersections. Avoiding utility poles is often more cost-effective than relocating them.

« Public utilities along Walnut Street, behind Biggs Mall, are concentrated within the narrow right-of-way and adjacent to surface parking.

Rear of biggs mall, utility poles and no sidewalk / pedestrian faciilties. »

« Large delivery vehicles utilize the rear entrance to Biggs Mall.

TRANSPORTATION CONTEXT

The transportation context includes both the roads themselves and a safety analysis.

VEHICLE CONDITIONS

Chestnut Street has a 35 MPH posted speed limit that increases to 55 MPH across the Lumber River Bridge.

Primed for pedestrian crossings, Roberts Avenue (NC 211) serves primarily as a corridor for heavy vehicle traffic, with little pedestrian amenities.

Walnut Street: Lower speeds and low traffic volume allow this corridor to be a valuable, and safe, pedestrian or bicycling connection for north-south travel.

EXISTING INFRASTRUCTURE CONDITIONS

Lack of connectivity to Jerry Giles Park, in need of sidewalk.

Chestnut at 2nd Street, sidewalk maintenance needed.

Chestnut at 2nd street Sidewalk, no crosswalk, and/or signal crossings.

PEDESTRIAN CONDITIONS

This project is a huge opportunity to improve walking and biking in Lumberton. ***There is evidence that people are putting themselves in danger*** (see photo below, top right-hand corner) to walk in the area, and this project aims to help reduce these safety risks.

There are a lack of sidewalks and crosswalks along Roberts Avenue (NC211), and some intersections are particularly wide (measuring 75 - 85 feet wide). Desire paths are visible, indicating that people need to walk along the road despite the safety risk.

Walnut Street has sidewalks that are not accessible (above the curb without an ADA curb ramp). They are too narrow, damaged, and not ADA-complaint. South of 14th street, sidewalks are too narrow and non-ADA compliant. Most intersections are unmarked for pedestrians, while some are significantly weathered, and not longer visible (example below) from Walnut Street.

Roberts Avenue at Elm Street & Highland Avenue intersection, lack of sidewalks and crosswalks.

Grass along Roberts Avenue worn down by pedestrians walking along the road.

Walnut Street low-accessibility sidewalks, in need of widening and ADA upgrades.

BICYCLE CONDITIONS

Conditions are also poor for people biking. Vehicle speeds that are greater than 25 mph as generally too fast to accommodate the average bicyclist.

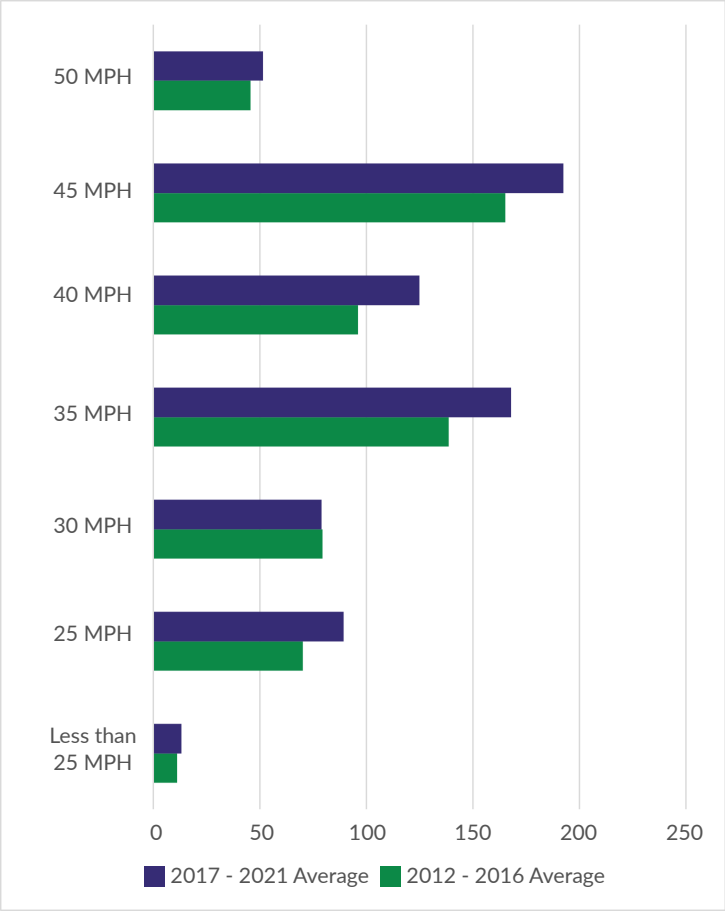
According to the National Highway Traffic Safety Administration (NHTSA), from 2017 - 2021, the most common speed limit for fatal crashes involving a bicyclist was 45 mph. In addition, NHTSA reported few pedestrian or bicyclist deaths occurred on 20 mph speed limit roads, averaging fewer than 20 people per year killed while walking or biking at this speed.

CRASHES & SAFETY

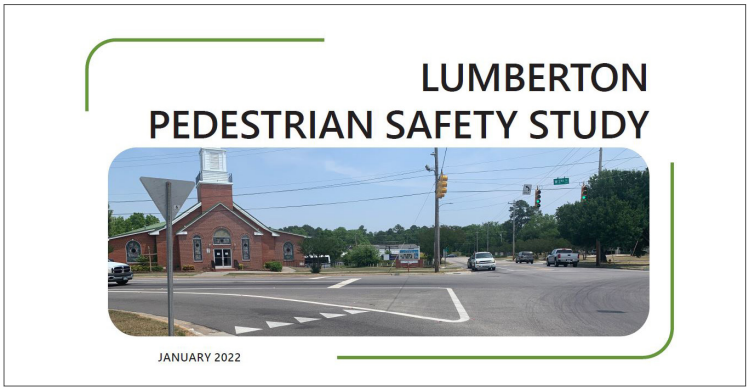
Lumberton must continue investing in safety for pedestrians, whether as stand-alone safety improvements or larger mobility infrastructure projects that involve bridge or culvert replacements, traffic signal upgrades, or pavement/restriping maintenance projects.

This Feasibility Study is an excellent opportunity to make our streets safer while also planning and designing for multimodal travel, flood risk resiliency, and recreation opportunities.

BICYCLIST DEATHS BY STRIKING VEHICLE SPEED LIMIT



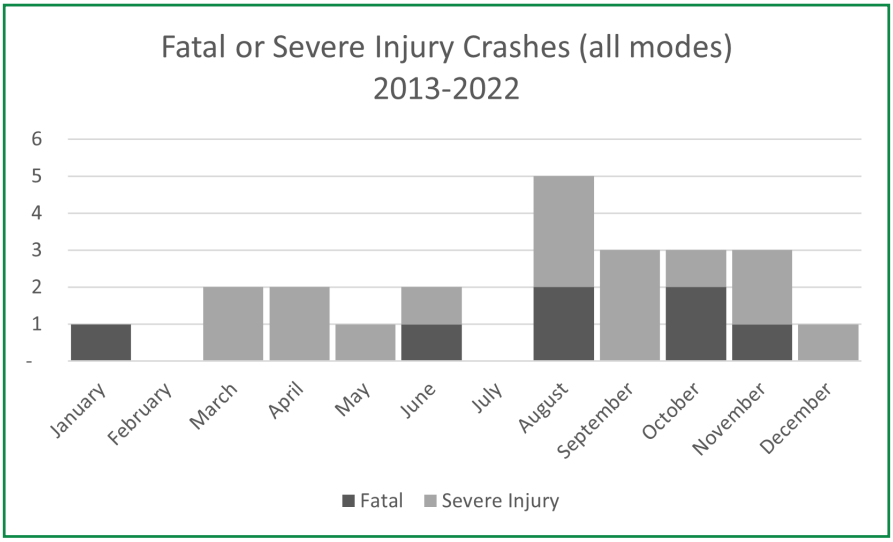
Source, NHTSA: Bicyclist Deaths by Speed Limit, noting an increase in fatalities above 40 mph, with most deaths occuring on over 20 mph roadways.

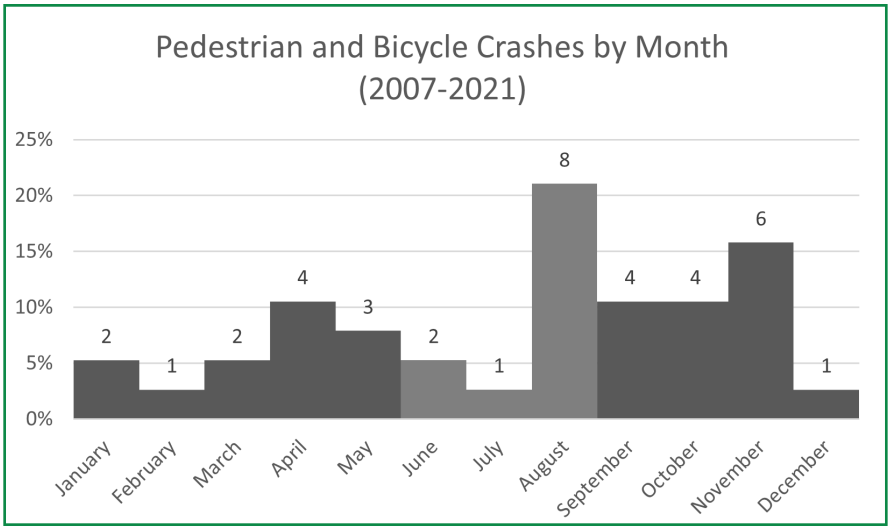


A 2022 pedestrian safety study *identified a disproportionate number of crashes along Roberts Avenue, among other streets in Lumberton.*

FINDINGS FROM THE 2022 PEDESTRIAN SAFETY STUDY HAS SUGGESTED...

- **August - November** months have higher proportion of pedestrian or bicycle crashes (2007-2021). This also correlates with vehicular crashes, which are also higher between August - November.
- **Mondays and Fridays** have a slightly higher number of pedestrian or bicycle crashes than other days of the week.
- **Intersection crashes** (68%) are more frequent for walking/biking than non-intersection (mid-block) crashes (32%).
- **Alcohol impairment (non-driver)** was a contributing factor for five (5) bicycle or pedestrian crashes (14%), which is nearly three times higher than the State average (4%).
- **Fayetteville Road** is a moderate-risk corridor, with a medium priority to add sidewalks (U-5797 project).
- **Roberts Avenue (NC 211)** is a high-risk corridor, and a high priority for adding sidewalks.
- **Second Street (NC 72)** is recommended for a Complete Street redesign to enhance sidewalks and add pedestrian refuge islands at Elm Street and Chestnut Street crossings (STIP No. HO-0014).





Source: NCDOT Traffic Safety Unit, multiple datasets (2007-2022).

"VERY wide 2-lane pavement, contributers to speeding."

"Cars need to slow down."

"Streetscaping is needed."

"Conserve the beauty by the river."

"No marked crosswalks along NC 211."

- Community engagement comments

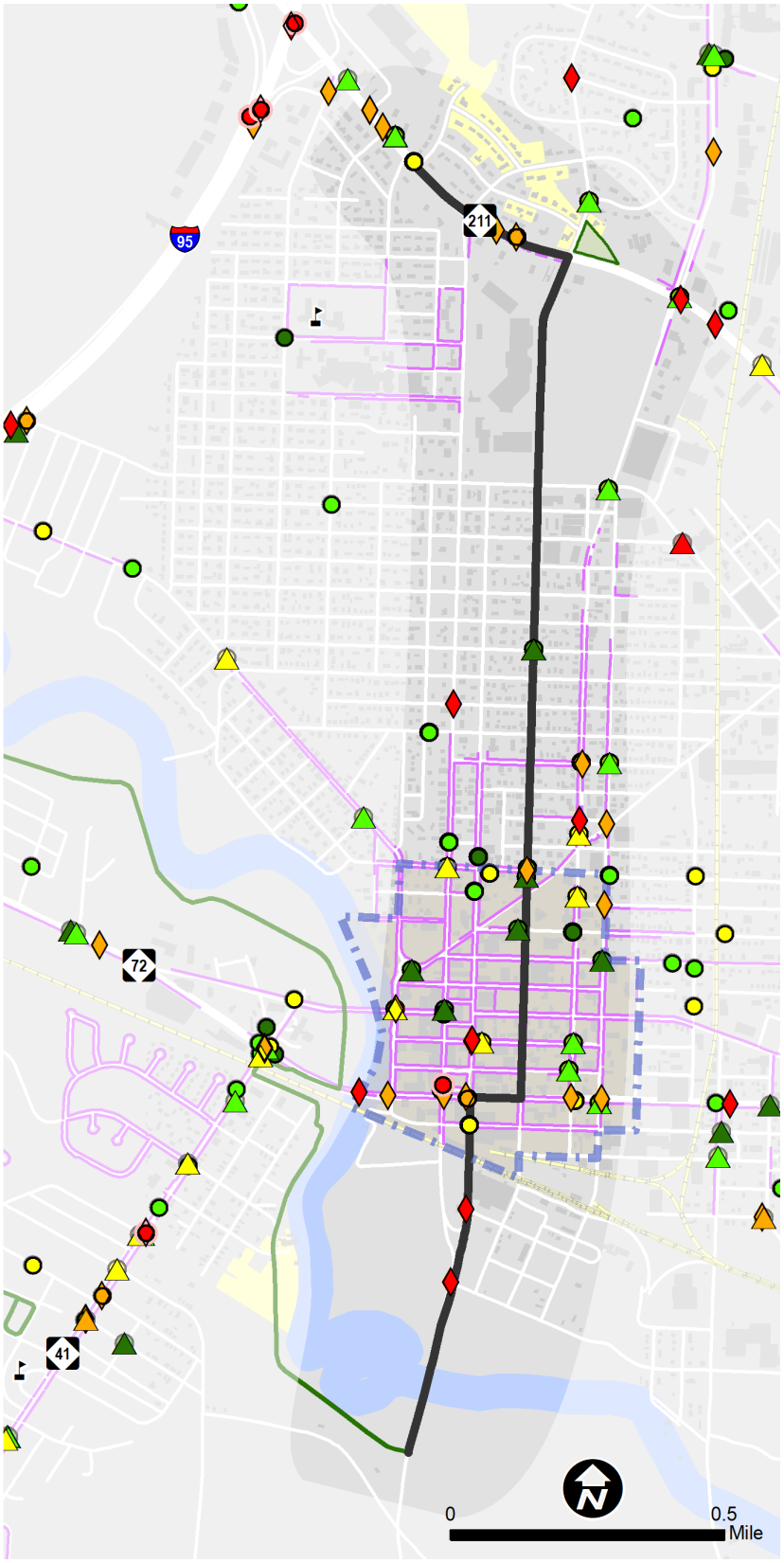


Figure 2.3: Crash severity map.

Source: NCDOT Traffic Safety Unit, multiple datasets (2007-2022).

3 COMMUNITY ENGAGEMENT

Including the public in the planning process provides knowledge of first-person experiences along the corridor, yielding a more complete understanding of community needs.

Involvement Context

PRIOR ENGAGEMENT EFFORTS

The Lumberton Floodprint (2019-2020) process built consensus around the needs and strategies for reducing flood risk, and strengthened social cohesion for positive change. City staff set out to understand neighborhood attitudes toward:

- Providing more public green space, and stormwater storage capacity
- Minimizing or mitigating flood risk through proactive land use decisions
- Improving access to recreation opportunities, including current and future facilities

The Floodprint project team met with the neighborhood residents many times, and included City Council Members and community leaders to solidify community support and commitment. ***The Lumberton Loop Trail was first identified and refined during these public meetings for the Floodprint planning process (2020).***

PLAN OUTREACH EFFORTS

The project team built on the momentum of the previous engagement efforts. Community engagement was developed in partnership with homeowners, businesses, elected officials, public staff, and other community networks. During outreach events, the team provided a project overview and a map of the corridor for markup of pain points for community members, allowing stakeholders to understand the details of the Feasibility Study and serve as a launching point for discussion.

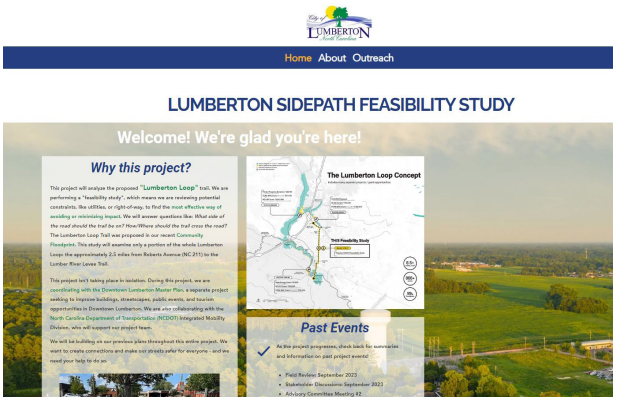
STAKEHOLDER DISCUSSIONS

- **Advisory Committee:** comprised of 16 technical staff from the City and NCDOT.
- **Focus Groups (x2):** September 12, 2023, in coordination with Downtown Master Plan stakeholder meetings.

Discussion with an interested citizen at the Rumba on the Lumber event.

ONLINE ENGAGEMENT

Project Website (www.LumbertonLoop.com): From the project website, participants were able to launch the online survey and interactive web map.



120+

Unique Visitors to the Website

Online Survey: The project team used the online survey to introduce the project purpose, identify some of the motivating (or discouraging) factors for walking or biking in Lumberton, and document some of the local safety hazards relating to mobility that residents may experience. The full survey results are included as an Appendix to this study.

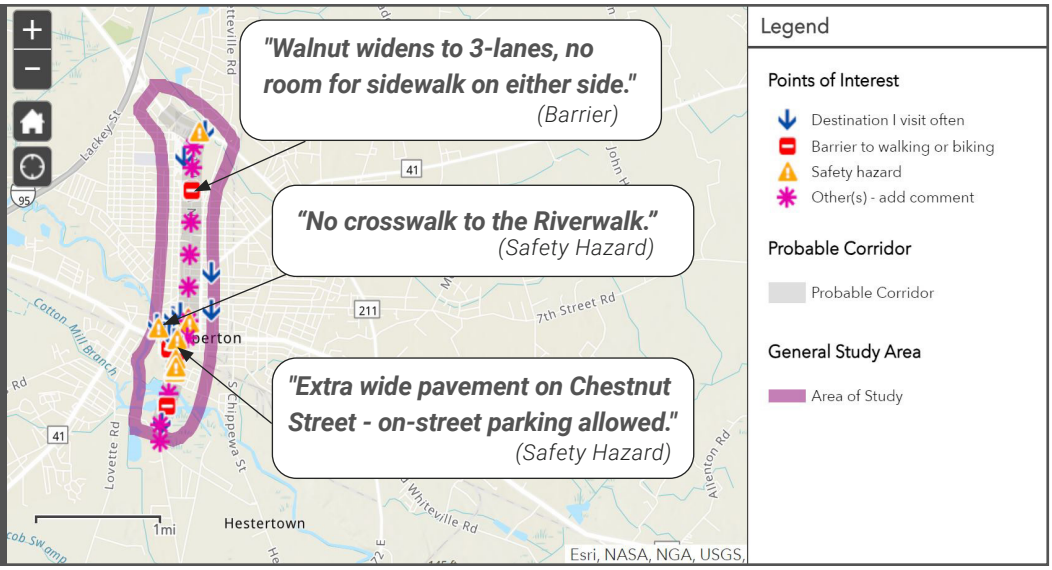
> ***"Plant more trees"***
> *- Survey Respondent*

> ***"More bike racks"***
> *- Survey Respondent*

> ***"Safety is the main concern for a senior."***
> *- Survey Respondent*

Interactive Map: The project team launched an interactive map using the ArcGIS Online platform in the fall of 2023. This digital platform was available 24-hours per day, and allowed participants to zoom to an area of their interest and provide comments on destinations they visit often, barriers to walking or biking, safety hazards, or other issues they find important.

The interactive map was available between August 2023 - May 2024.



COMMUNITY OUTREACH EVENTS

The project team was involved in two community outreach meetings, which are essential to our project goal of helping vulnerable populations plan for investments within their community.

Public Event #1: In coordination with the City of Lumberton Downtown Plan, our project team attended a widely publicized event on the evening of Tuesday September 12, 2023, held at the Carolina Civic Center.

We were able to discuss the feasibility study project with more than two dozen attendees, and generate feedback on local destinations along the trail that attendees visit often.

Public Event #2: Members of the project team also attended the *Rumba on the Lumber* event on Saturday March 2nd, 2024, and shared a tent with other City of Lumberton staff.

An initial draft concept map was shared with potential photosimulations of how the proposed mobility improvements would fit within the existing public rights of way.

> ***"Just get me across NC 211 and I'd use this."***
> *- Attendee, Rumba on the Lumber*

> ***"I like [the traffic calming] through here. Cars need to slow down [in residential areas]."***
> *- Attendee, Rumba on the Lumber*

KEY TAKEAWAYS

Overall, we learned that...

- Crossing Roberts Avenue (NC 211) remains the obstacle to access at the north end of the corridor.
- Staying within the existing right-of-way and curblines is a supported implementation strategy.
- Traffic calming, including neighborhood traffic circles, were well-received by residents.

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4 ALTERNATIVES & RECOMMENDATIONS

Alternatives Development

The project team considered alternative options for the Lumberton Loop trail. The alternatives retained the same beginning and ending locations, and examined different facility types, crossing treatments, and their relative tradeoffs for walkability, safety, and constructibility.

Connecting with Downtown Lumberton was discussed as a valuable option, however, it was not necessary to route directly through downtown along the one-way paired streets (Elm and Chestnut).

Elm Street and Fayetteville Road are parallel roads that were also considered as alternative route segments. South of downtown, there are three roads that cross the railroad tracks, and all three were considered (Elm Street, Chestnut Street, and Walnut Street). While reviewing alternative alignments, the project team outlined the following strategy for the trail.

The preferred Lumberton Loop trail must...

- **Accommodate** walking and biking needs to be truly multimodal;
- **Avoid or minimize** the potential impact on existing rights of way, adjacent properties, stormwater infrastructure, utilities, or street trees;
- **Minimize** the creation of new, impervious surfaces that would contribute to flood hazards;
- **Coordinate with**, rather than conflict, with concurrent transportation improvement projects that align or overlap our corridors, notably along Roberts Avenue (NC 211), Fayetteville Road and 2nd Street (NC 72);
- **Improve** safety at all intersections, and incorporate guidance from NCDOT Traffic Safety Unit and Division 6 engineer staff;

E. 2nd Street - NC 72 (looking west).

POTENTIAL ALTERNATIVES

Considering the general strategy above, the project team reviewed each north-south roadway segment, and each of the possible east-west segments in order to physically connect Jerry Giles Park with the Lumber River Levee Trail.

Elm Street corridor: Predominantly a residential street, Elm Street also serves as the 'front-door' for Biggs Mall. The one-way portion(s) of Elm Street (south of 15th Street) poses a challenge for bicyclists traveling on-road in the opposite direction, which required the consideration of also using Chestnut Street.

Walnut Street corridor: The rear access to Biggs Mall, this corridor supports much lower vehicle traffic, however, larger delivery trucks are common. Further south, Walnut Street becomes a quiet, residential street extending directly into Downtown, and intersecting Second Street (NC 72).

Fayetteville Road / Pine Street corridor: Fayetteville Road (Pine Street) is more retail-focused that either of the parallel routes, with driveways, parking lots, and more vehicles that pose safety hazards for pedestrians.

Pedestrian connections through Biggs Mall or Meadowbrook Cemetery: Indirect paths through the Biggs Mall parking lot are present, however, a viable public-use path is not possible. Similarly, the walls surrounding the Meadowbrook Cemetery limits the utility of a pathway that winds through private property. These potential connections were dropped from consideration early in this process.

Elizabethtown Road corridor: This NCDOT-maintained roadway is an ideal candidate for shifting the trail towards downtown. This segment of roadway is signed as 20-mph speed limit, however, there are more than 5,000 vehicles per day (on average), a very constrained ROW, and many business driveways that severely limits its effectiveness as a potential multimodal corridor.

Crossing the Railroad corridor: South of downtown, there are three roadways that cross the existing railroad tracks. Elm Street and Chestnut Street are one-way pair streets, meaning that pedestrians and bicyclists must also split into different directions, or they would be traveling against vehicles (unsafe). Walnut Street crosses the railroad through a heavily industrialized zone, with large trucks and equipment passing vulnerable pedestrians.

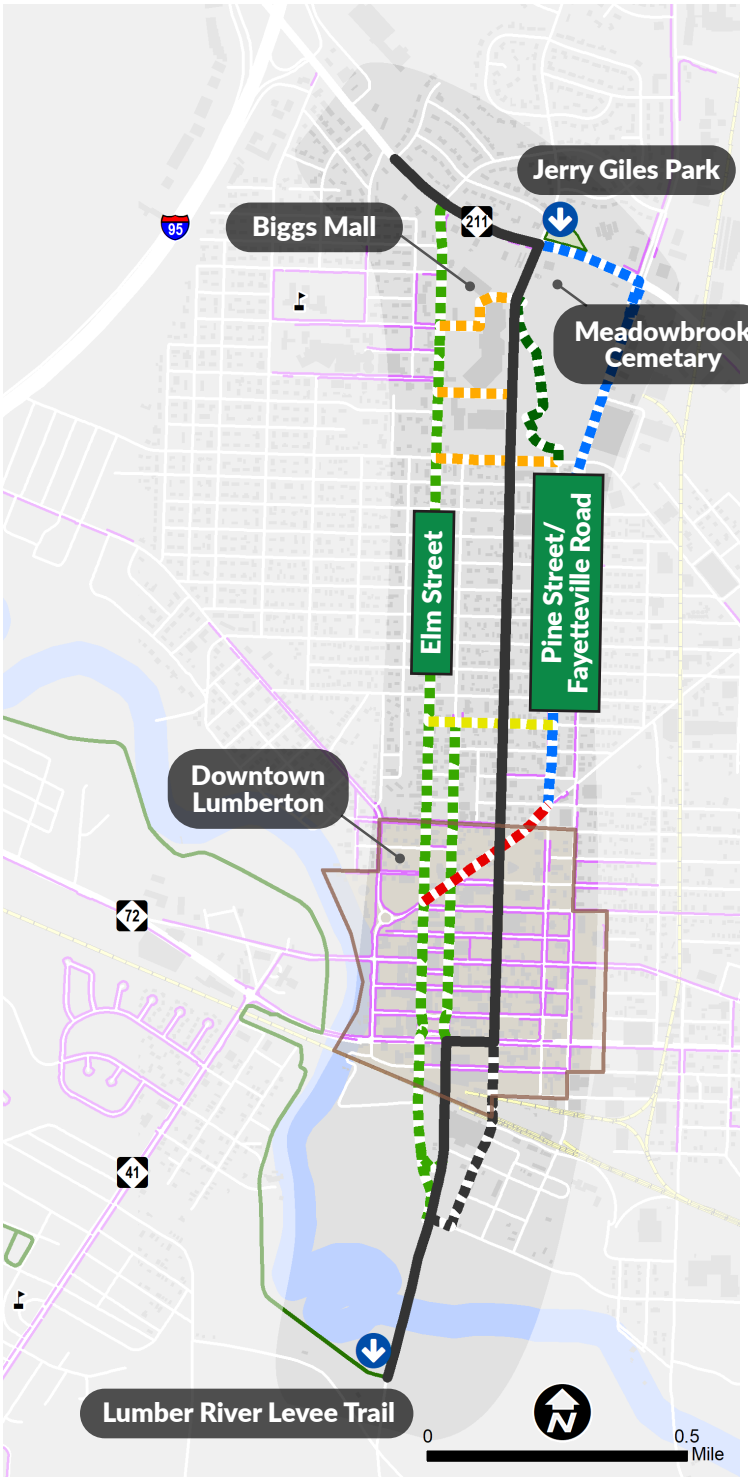


Figure 4.1: Alternative routes considered.

EVALUATION OF ALTERNATIVES

The following evaluation criteria were used to guide the decision-making process from several alternative alignments toward the most appropriate alignment. Criteria were derived from the City's initial grant application submittal, and discussions with advisory committee members.

Evaluation Criteria

The project team used the following criteria to examine how well each alternative would support the overall purpose of the Lumberton Loop project:

- Accommodating both walking and biking
- Improve safety for all modes
- Minimize impact to existing rights-of-way (ROW)
- Minimize new impervious surfaces
- Coordinate with existing NCDOT projects
- Align with Giles Park entrance (Walnut Street)

DECISION MATRIX RESULTS

The decision matrix is a qualitative assessment tool used by the project team to relatively rank each of the potential alignments based on the evaluation criteria established above. This is a qualitative (subjective) process that seeks the more-desirable, or least potential impact per category.

Evaluation Criteria	Alternative Alignments Considered				
	Elm St	Walnut St	Fayetteville Rd	Elizabethtown Rd	Elm / Chestnut St
Accommodate walking & biking	●	●	◔	◔	◔
Improve safety	◕	●	◑	◑	●
Minimize potential ROW impact	◑	◕	◔	◔	◕
Minimize new impervious surfaces	◕	◕	◑	◔	◔
Coordinate with NCDOT projects	◕	●	◑	◔	◑
Align with Giles Park	◔	●	◔	○	◔
Note: this is a qualitative assessment, all values are relative to one another, rather than absolute rankings (1st - 5th)					

●	High: most desirable; least potential impact to property
◕	Moderate-High: desirable; low potential impact to property
◑	Moderate: desirable; some potential impact to property
◔	Low: Least desirable; most potential impact to property
○	Not applicable: does not apply

Figure 4.2: Decision matrix results.

Recommended Alignment

Walnut Street was chosen as the recommended alignment since it received higher desirability rankings than parallel routes (Elm Street, Fayetteville Street). Walnut Street directly connects Jerry Giles Park with the proposed safety improvement project along Second Street (NC 72), and therefore utilizing two blocks of improved bike/ped conditions as well as ~14 blocks of existing sidewalks that this project will not have to plan, design, or construct.

South of Downtown Lumberton (Second Street) the planning team reviewed several options for routing pedestrians and bicyclists along the one-way streets of Elm and Chestnut. To minimize crossing these streets multiple times, the project team in coordination with City staff and NCDOT Division staff decided to reproportion one of the two existing travel lanes along northbound Chestnut Street (< 1,500 vehicles per day) and utilize this space for walking or biking. Similar safety improvements were identified for the intersection of S Elm Street and Chestnut Street, converting this free-flow lane into a traditional stop-controlled intersection.

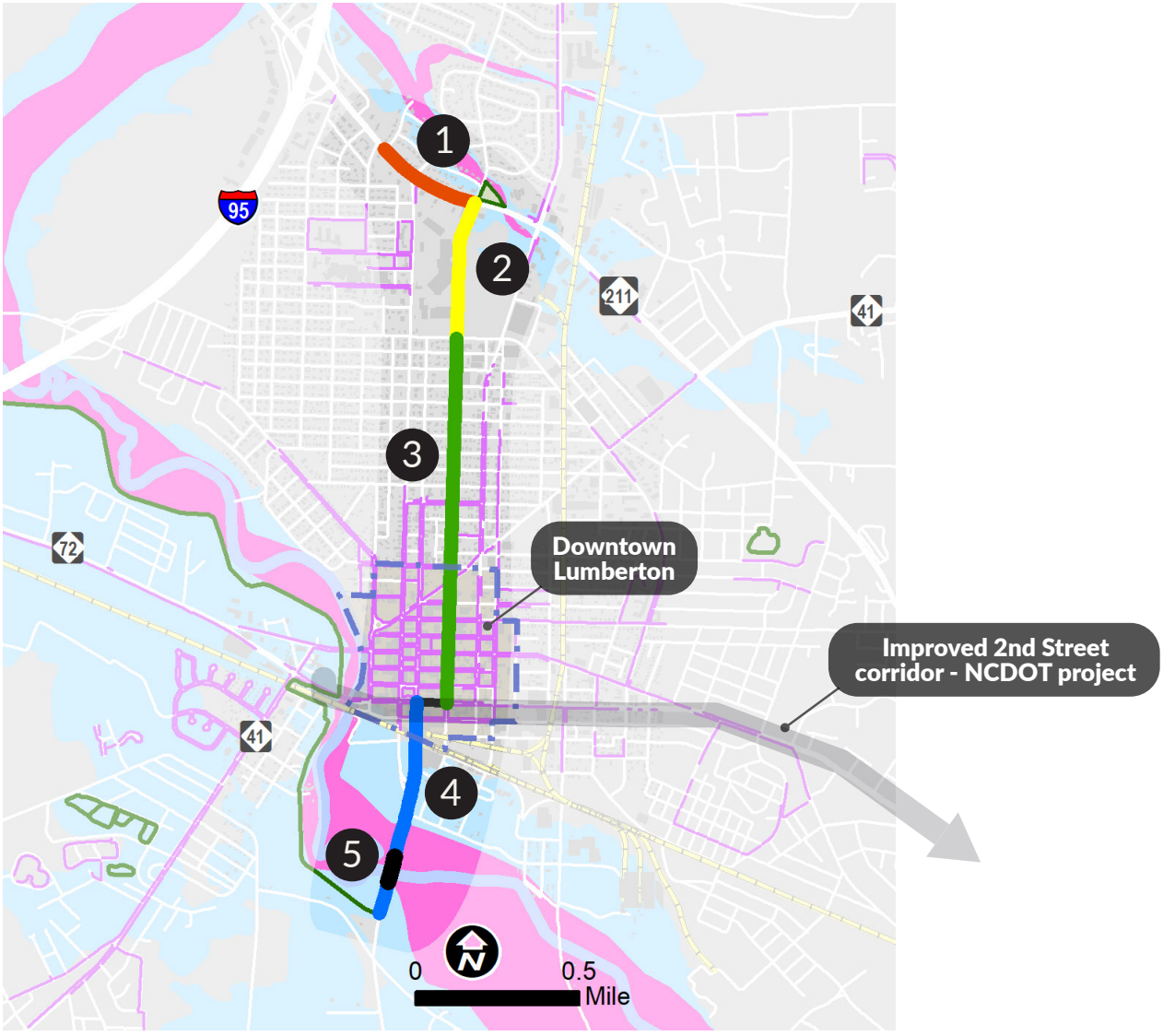


Figure 4.3: Project corridor - segments.

SEGMENT PHASING

The road-side portions of the Lumberton Loop will not be constructed all at once, but rather in segments, and probably through several different projects. The project team considered roadway ownership (maintenance) to divide the corridor into logical segments for design and construction. The five (5) corridor segments are described below, from north to south:

1. **Roberts Avenue (US 211**) – NCDOT maintained, 5-lanes, 45 mph, 28k vehicles per day

2. **N Walnut Street** – rear of Biggs Mall – City maintained, 3-lanes, 35 mph, less than 2k vehicles per day (assumed)

3. **N Walnut Street** – residential area to downtown – City maintained, 2-lanes, 35 mph, less than 2k vehicles per day (assumed)

4. **Chestnut Street – south of Downtown** – NCDOT maintained, 2-lanes, 35 mph, 1,500 vehicles per day (northbound), crosses existing railroad tracks and increases to 55 mph near the Lumber River bridge

5. **Lumberton Bridge** - NCDOT maintained, 2 lanes, 35 mph, 3,300 vehicles per day, and transitions to 55 mph for southbound traffic

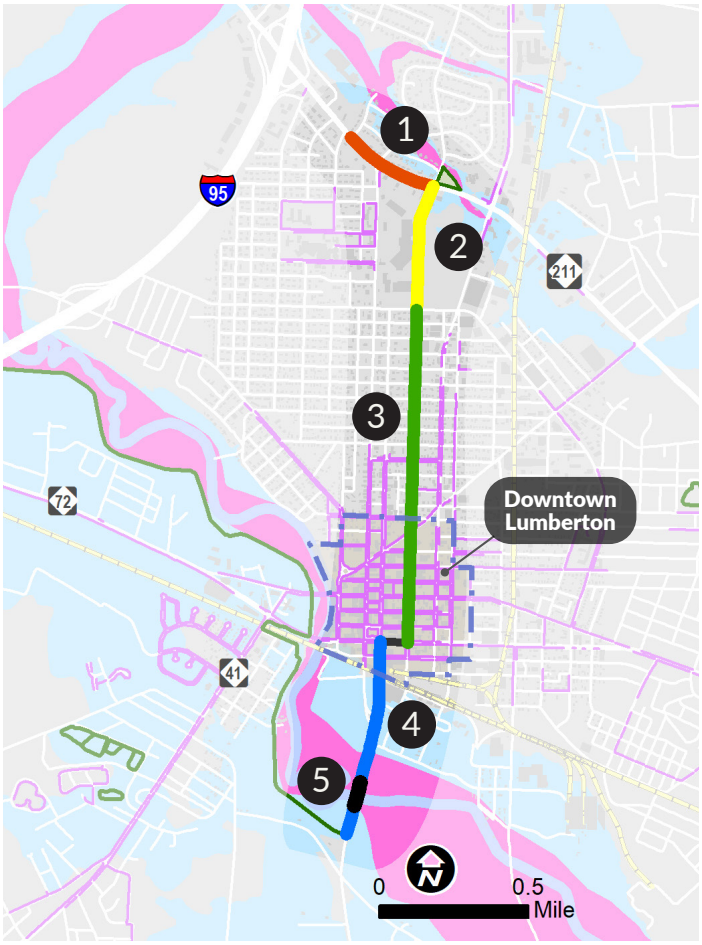


Figure 4.4: Recommended phasing by segment.

The project team noted that segments 1-3 would connect with the existing Lumber River Levee Trail along Second Street (NC 72) in downtown, and this connection would be enhanced by the streetscape / safety project currently under design by NCDOT. Segments 1-3 were therefore identified as near-term priorities, while segments 4-5 extending further south to the additional Levee Trail entrance would be longer-term priorities.

Each of the five segments were reviewed for potential pedestrian and bikeway treatments and their potential constructability (i.e., the feasibility to design and build these facilities with minimal impact). The project team used similar evaluation criteria as the alignment alternatives: safety, potential ROW impact, and limiting new impervious surfaces. The results are displayed in Fig 4.4.

MULTIMODAL FACILITY TREATMENTS - DECISION MATRIX RESULTS

Segments	Multimodal Treatments Considered						
	Pedestrian Treatment				Bicycle Treatment		
	Sidewalk 1-side	Sidewalk 2-sides	Sidepath 1-side	Sidepath 2-sides	Shared Lane Markings	Bike Lanes	Separated Bike Lanes / Shared Use Path
1 – Roberts Avenue *(NC 211)*	◑	◕	◕	●	◔	◔	●
2 – N Walnut Street (rear of Biggs Mall)	○	○	○	○	◕	◕	●
3 – N Walnut Street *(residential)*	●	●	○	○	◕	○	○
4 – S Chestnut Street	◑	◕	●	●	◔	◔	●
5 – Lumber River Bridge *(separate bridge)*	◕	◑	◔	◑	◔	○	◔
Note: this is a qualitative assessment, all values are relative to one another, rather than absolute rankings (1st - 5th).							

●	High: most desirable multimodal benefit
◕	Moderate-High: desirable multimodal benefit
◑	Moderate: desirable multimodal benefit
◔	Low: Least desirable multimodal benefit
○	Not applicable: does not apply

Figure 4.5: Multimodal facility treatments - decision matrix results.

Recommendations

The recommended route follows Walnut Street (behind Biggs Mall), Second Street (NC 72) in Downtown, and S Chestnut Street heading south of downtown toward the Lumber Levee Trail. This alignment maximizes multimodal benefits while minimizing the potential impact to ROW and property owners, described previously.

Multimodal treatments are proposed for the five segments, including sidewalks and sidepaths (shared use paths) for pedestrians, curb extensions and traffic circles for speed reduction, and shared lane markings or separated bike lanes for bicyclists. There are also recommendations for improvements at signalized intersections to improve safety and visibility.

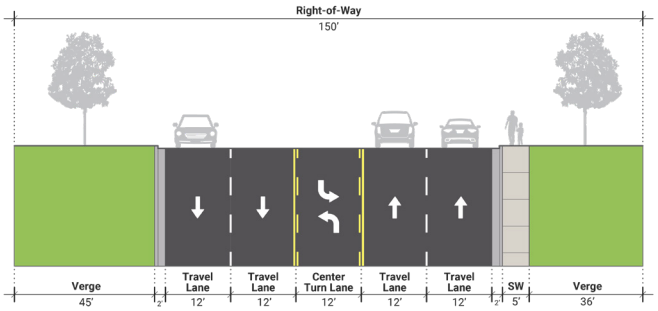
To visualize these recommendations, refer to the typical cross-sections and photosimulations on the following pages.

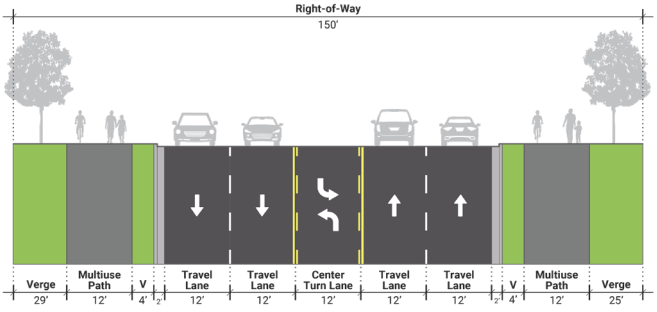
TYPICAL CROSS SECTIONS ALONG THE LUMBERTON LOOP

Existing

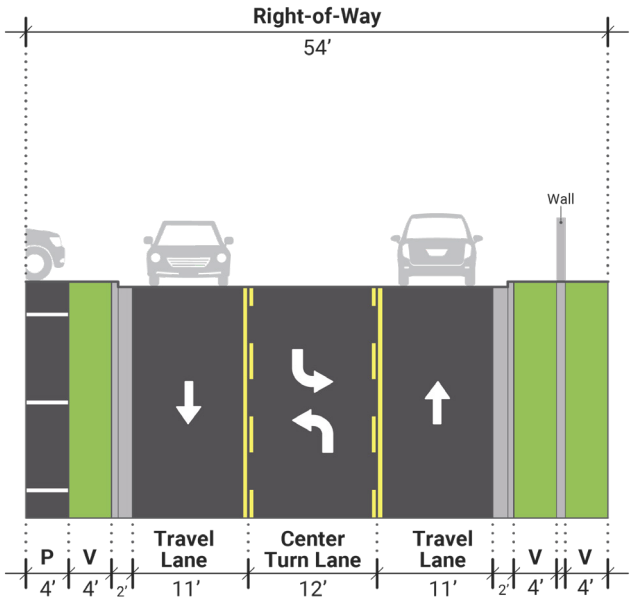
Proposed Concept

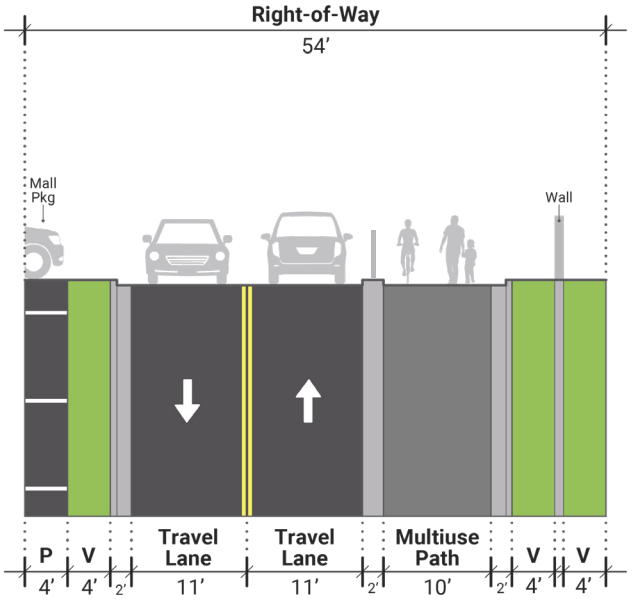
1 Roberts Avenue NC 211





2 North Walnut Street - Rear Biggs Mall



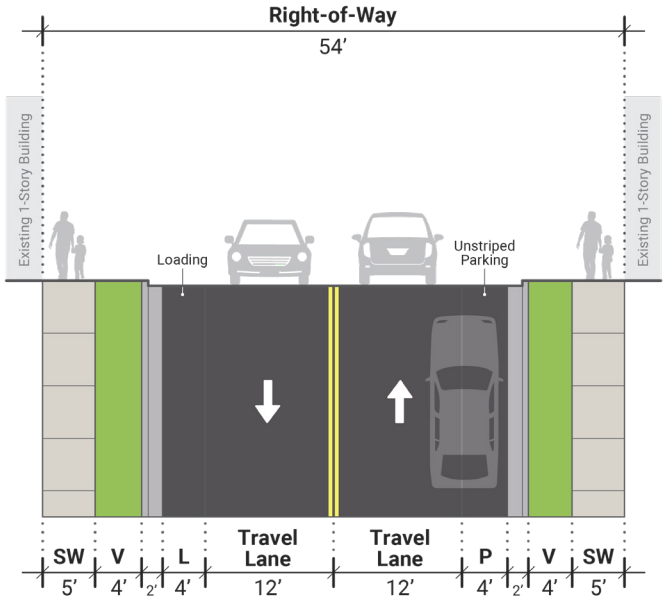


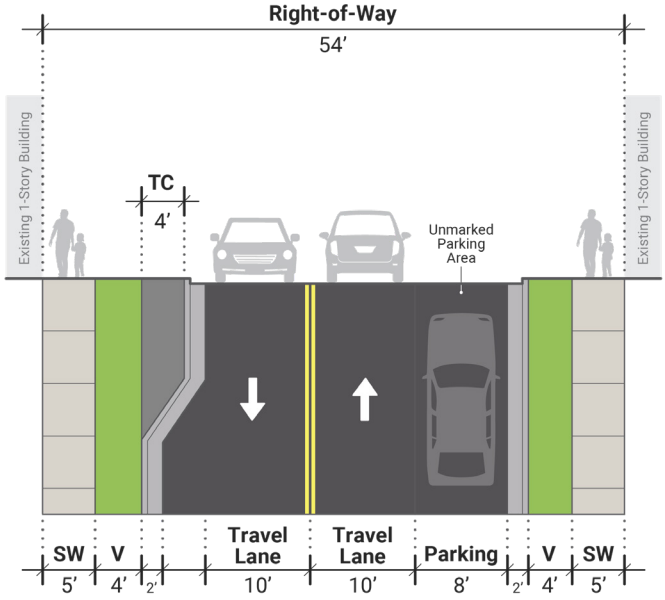
DRAFT CONCEPT
NOT FOR CONSTRUCTION

Existing

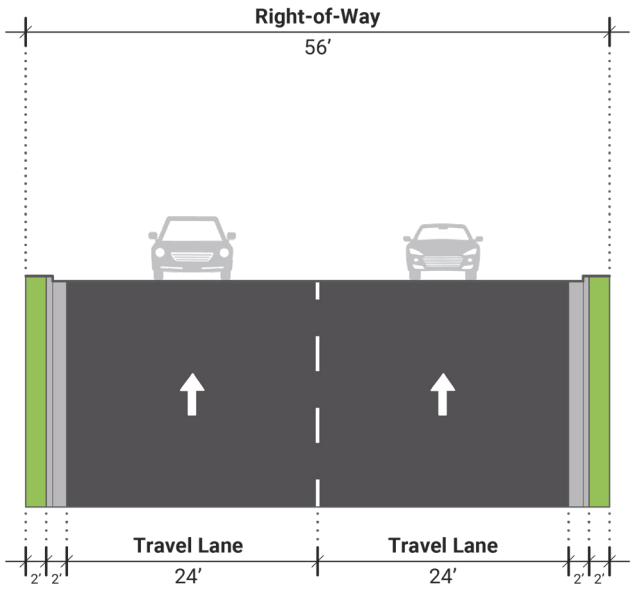
Proposed Concept

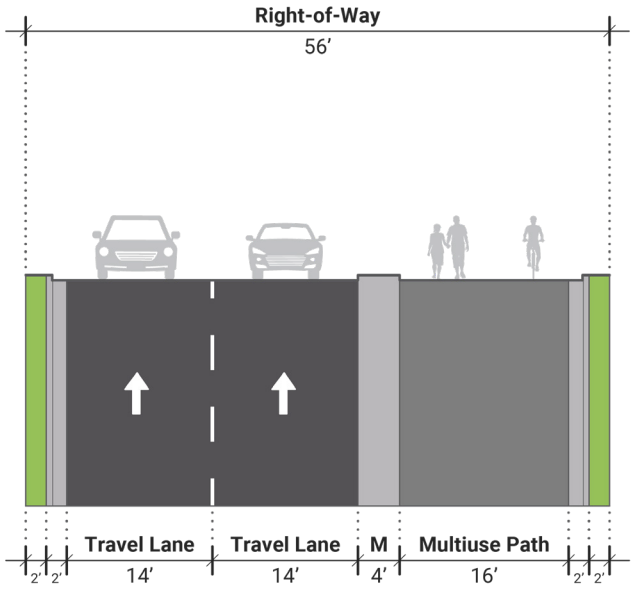
3 North Walnut Street near 22nd Street





4 South Chestnut Street - Near Noir Street





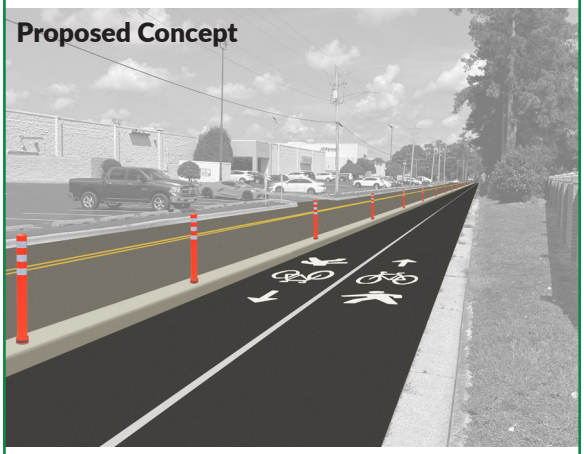
DRAFT CONCEPT
NOT FOR CONSTRUCTION

PHOTOSIMULATIONS

EXTRA PAVEMENT

Existing

Proposed Concept



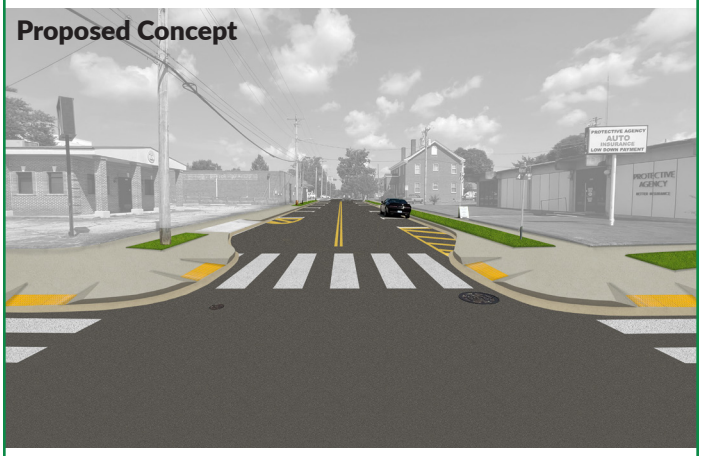
Walnut Street at rear of Biggs Mall

2

CURB EXTENSION

Existing

Proposed Concept

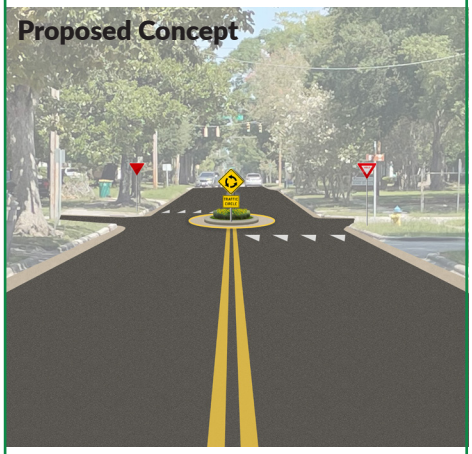


Walnut Street at 4th Street

3

NOTE: These roadways are city-maintained, requiring less coordination. City of Lumberton public works staff may choose to design and construct these individually, over several years.

TRAFFIC CIRCLE

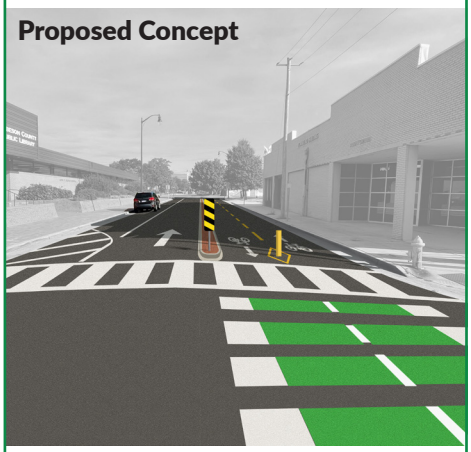


Walnut Street at 8th Street

3

NOTE: These roadways are city-maintained, requiring less coordination. City of Lumberton public works staff may choose to design and construct these individually, over several years.

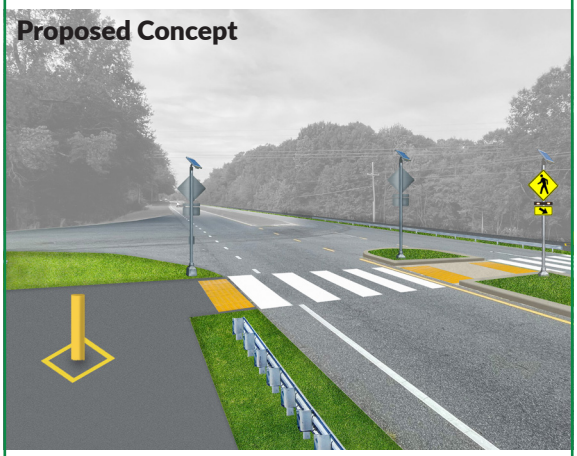
TWO WAY BIKE LANE



South Chestnut Street at First Street

4

MID-BLOCK CROSSING



South Chestnut Street at Noir Street

4

Planning-level costs represent the best information available, incorporating individual unit cost from 2023 construction estimates for materials, and assumptions for preliminary engineering (15%), construction engineering and inspection (15%), contingency (30%), and NCDOT oversight (5%).

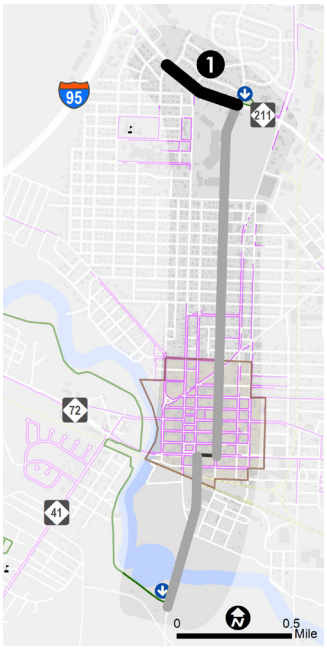
SEGMENT RECOMMENDATION DETAILS

Segment 1 – Roberts Avenue (NC 211)

Description: Sidepaths for both walking and biking (12-foot wide) are proposed along both sides, with marked crosswalks and pedestrian countdown signals needed at Elm Street and Walnut Street intersections. The existing 5-lane roadway, travel lanes, and curbs remain unchanged.

Notable: This corridor is 5-lanes wide, with a 45-mph posted speed limit, and carries 28k vehicles per day. There are some existing sidewalk segments, however, **no safe pedestrian crossings at signalized intersections**. Coordinate with planned RAISE grant project at Elm Street intersection to improvement pedestrian safety.

Sidepaths should be extended 0.1 miles further east, to connect with Fayetteville Road and the NCDOT improvement project (U-5797) along that corridor. This recommendation is beyond the project limits of this feasibility study, and therefore the costs are excluded.



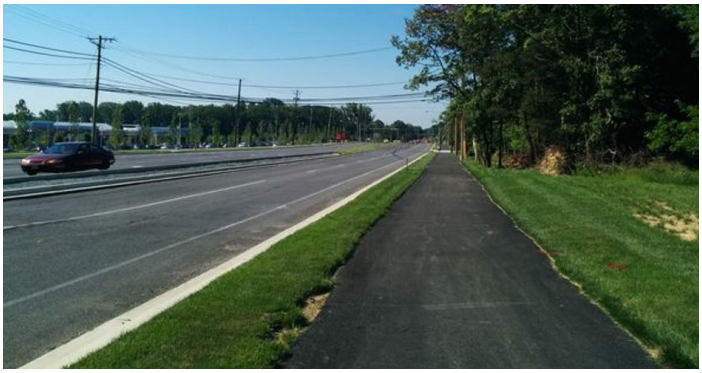
DESIGN CONSIDERATIONS:

- 4,000+ feet of asphalt shared use path
- 36 marked crosswalks (1 per travel lane)
- 8 pedestrian signals needed (2-per direction; total of 16)
- Pedestrian lighting, signage, and bollards at entry/exit points
- Opportunity to modify the free-flow lane onto Elm Street (southbound)
- Opportunity to consolidate driveways near businesses along Roberts Ave (NC 211)
- 0.41-mile segment length (centerline miles)

PLANNING LEVEL COST ESTIMATE:

- $1.5M - $1.8M

Existing Jerry Giles Park entrance.

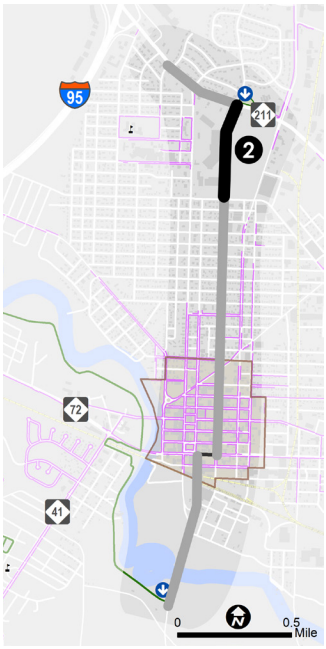


Example of a 12 -foot wide sidepath.

Segment 2 – N Walnut Street (rear of Biggs Mall)

Description: The project team recommends converting the center turn lane into the northbound travel lane, installing a raised median (2-feet wide) and utilizing the remaining 10-feet of pavement as a walking and biking shared use path.

Notable: There is insufficient ROW width above the curb for sidewalks on either side of this corridor. Existing utilities, surface parking, and the adjacent Meadowbrook Cemetery wall further limits constructability. Reproportioning the existing three-lanes is the only option to accommodate both pedestrians and bicycles within this constrained ROW. This segment will require coordination with Biggs Mall property owners, and may impact large truck deliveries, parking, and should also include closure of some of the redundant driveways.

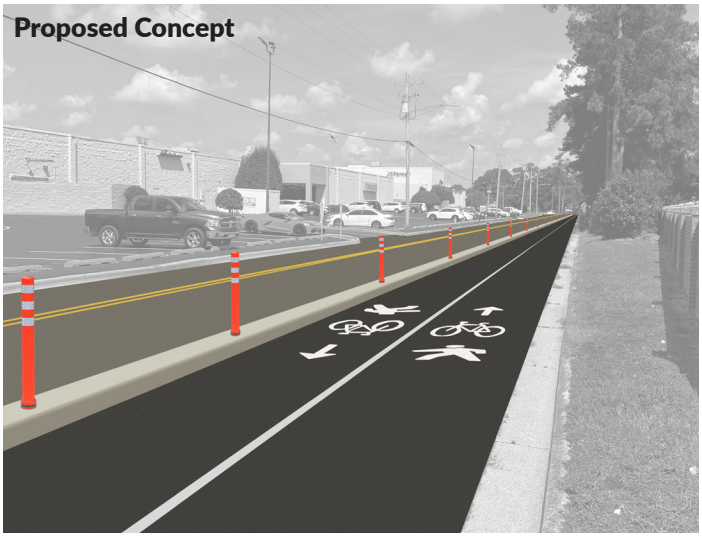


DESIGN CONSIDERATIONS:

- 2,000+ feet of raised median (2 feet wide)
- 3,000+ square yards of green paint for the bike/walk segments
- 4 pedestrian signals needed (2-per direction)
- Restriping of vehicle stop bars, laneage, and arrows
- 20+ plastic bollards (tubular markers) near entry/exit points
- Opportunity to use existing asphalt for multimodal purposes, rather than vehicles
- 0.43-mile segment length (centerline miles)

PLANNING LEVEL COST ESTIMATE:

- $500k - $750k



Recommended conversion of one travel lane to walking and biking. This improvement has two options:

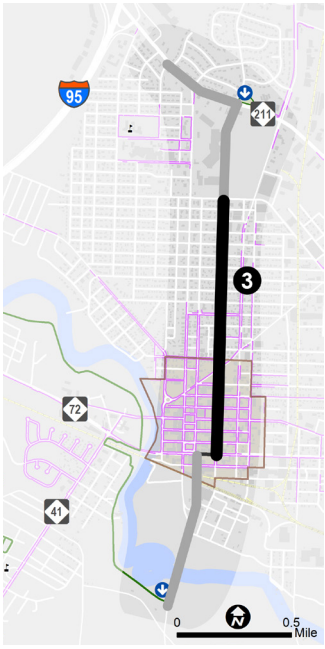
- *Low intervention: striping and flexposts only. This may be best for a temporary, "test-fit" option.*
- *High intervention: add concrete median to vertically separate traffic.*

Segment 3 – N Walnut Street (residential)

Description: A combination of curb extensions at intersections and traffic circles are proposed to further reduce vehicle speeds along this residential street. Share lane markings are feasible for most bicyclist skill levels because the existing traffic volumes are low (assumed <1k cars per day), and vehicle speeds can be managed through traffic calming. Existing sidewalks end at 14th Street, and are recommended to extend further north 10-blocks on both sides (5 foot wide).

Notable: The residential portion of this corridor would benefit from speed reduction strategies (traffic calming) to accommodate bicyclists on-street, and within the existing pavement. There is insufficient ROW above the curb to provide a 10-foot shared use path to accommodate both walking and biking. Avoidance or mitigation of driveways, mailboxes, plantings, fire hydrants, and power poles within or adjacent to the ROW will be necessary.

NOTE: Public work staff may design and construct these improvements in-house.



DESIGN CONSIDERATIONS:

- 4,500+ feet of new sidewalk (5 feet wide) on both sides, between 14th Street and 24th Street
- ADA curb ramps at 20 intersections (4 per intersection)
- Curb extensions at six (6) intersections
- Traffic circle at four (4) intersections
- Restriping of vehicle stop bars, laneage, and arrows
- 80+ plastic bollards (tubular markers) and signage at intersections
- Opportunity to slow vehicles, and reduce posted speed limit to 25 mph
- 1.12-mile segment length (centerline miles)

PLANNING LEVEL COST ESTIMATE:

- $2.3M - $2.75M

This improvement has two options:

- *Low intervention: striping and flexposts only. This may be best for a temporary, "test-fit" option.*
- *High intervention: add concrete median to vertically separate traffic.*

Existing Walnut Street at 18th Street intersection.

Example of curb extension treatment.

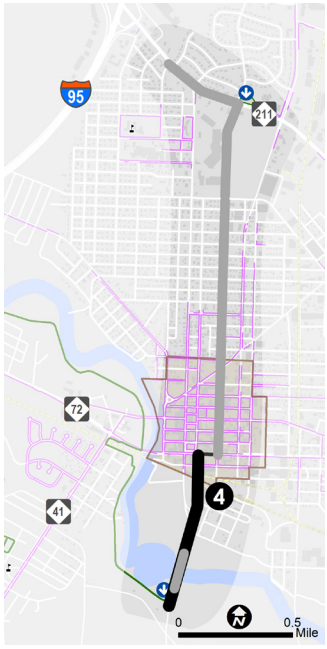
Segment 4 – S Chestnut Street (south of Second Street (NC72))

Description: A two-way separated bike and walk lane is proposed along the east side of S. Chestnut Street, between Hines Street and Second Street (0.2 miles). Repurposing excess pavement means no new impervious surfaces are created. Marked crosswalks and ADA curb ramps are recommended for non-signalized intersections.

A 12'-wide sidepath is recommended south of Hines Street, with new curb and gutter provided. The sidepath crosses the roadway once at Noir Steet, with a Rectangular Rapid Flashing Beacon (RRFB) recommended at this non-signalized intersection, and utilizing the existing median as a pedestrian refuge island.

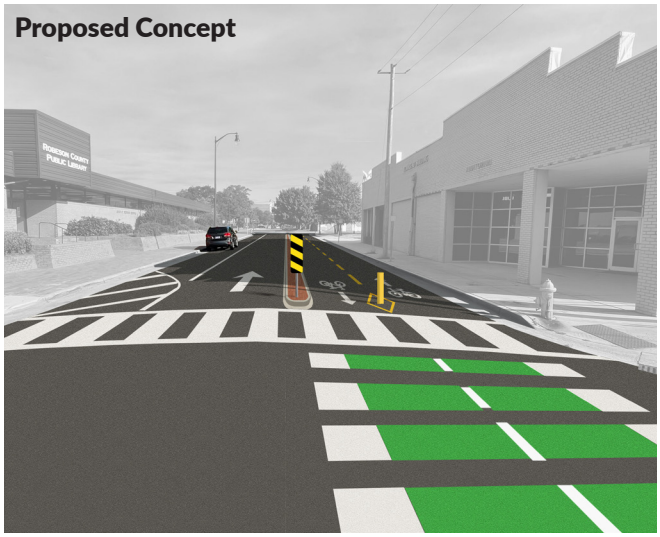
Notable: NCDOT Division staff noted the low existing traffic volumes (<1,500 vehicles per day) along S. Elm and S. Chestnut Streets, which allows for the **lane reduction and addition of on-street parking** adjacent to the Robeson County Library (one-block). Crossing the railroad tracks is less challenging with the reduction from two lanes to one lane. A traffic shift for northbound vehicles is recommended to align vehicles away from walkers and bikers, and convert the S. Elm Street free-flow lane into a stop-controlled intersection.

Coordination with the NCDOT redesign project along Second Street (HO-0014) is necessary for the pedestrian crossing and markings. Further coordination with the City's Downtown Master Plan (ongoing) is encouraged to promote walking and biking through downtown.



DESIGN CONSIDERATIONS:

- 1,500+ feet of raised median (two feet wide) north of Hines Street
- 2,000+ feet of new curbing and asphalt sidepath (12 feet wide) south of Hines Street
- Marked crosswalks at four intersections
- Midblock crossing – Rectangular Rapid Flashing Beacon at Noir Street
- Requires NEPA permit process to impact wetlands and floodplain to build the sidepath along the west side slope
- Opportunity for gateway entrance from the south, slowing vehicle speeds, and reproportion existing asphalt / impervious surfaces
- 0.66-mile segment length (centerline miles)



Recommended S. Chestnut Street conversion.

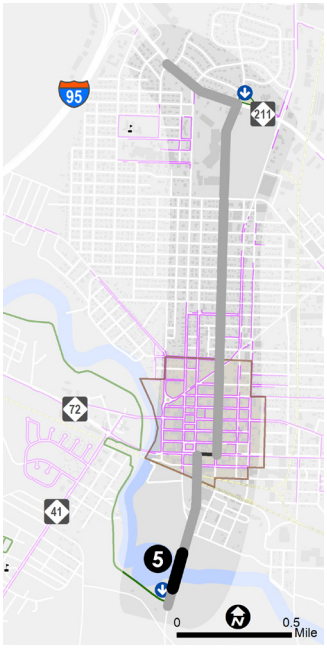
PLANNING LEVEL COST ESTIMATE:

- $2.3M - $2.75M

Segment 5 – Lumber River Bridge

Description: A prefabricated steel pedestrian-bicycle bridge is recommended across the west side of the roadway. Constructing a new structure which may require an easement or ROW aquisition, will be less expensive than a potential retrofit of the existing roadway bridge to support new loads. The City of Lumberton and Lumber River Conservancy own the land on both sides of the existing bridge.

Notable: The existing roadway bridge is considered "sufficient" and will not be scheduled for replacement for 20+ years, provided there is not an emergency replacement event.



DESIGN CONSIDERATIONS:

- 320-foot pedestrian-bicycle bridge (15-feet wide) with support piers
- Cut and fill slopes along west side
- Adjacent properties owned by the City of Lumberton, and Lumber River Conservancy
- Coordination with Duke Energy overhead utility ROW
- Directly connect with Lumber River Levee Trail along the west side of the roadway

PLANNING LEVEL COST ESTIMATE:

- $1.6M - $2M

Example of prefabricated steel pedestrian-bicycle bridge.

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5 IMPLEMENTATION

Implementation Overview

The implementation of the recommendations contained in the Lumberton Loop Feasibility Study will require a concerted, long-term effort from the City of Lumberton, but also require support from affiliated partners, like NCDOT, Robeson County, and citizen or advocacy groups. The purpose of this section is to present recommended project phasing and connect it to possible funding and other implementation options.

The project's implementation is informed by surrounding land uses that, in turn, influence aspects of design, feasibility, and cost along different segments of the route. These segments begin at the north end from NC 211/North Roberts Avenue in commercial areas before transitioning to residential neighborhoods, downtown Lumberton, then reaching the southern terminus at a connection with the existing Lumber River Trail. The variety of land uses is indicative of the variety of stakeholders and potential partners, including:

- NCDOT central offices and Division 6 personnel
- Commercial owners/tenants of Biggs Mall properties
- Single-family residential homeowners lining both sides of the preferred route
- Business and government interests and property owners in downtown, and advocacy groups that support the Lumber River Trail with a southern connection.

NEXT STEPS & STRATEGIES

While moving directly into revenue generation, it's important to first recognize the context, physical settings, and local partnerships unique to the Lumberton Loop Project. The phasing that defines the project's development is as important as the financing and implementation options that can serve each project phase.

This section discusses the optimal project phasing, partnerships, and implementation opportunities available to facilitate the recommendations of the Lumberton Loop Feasibility Study. The key next steps include the following:

- **Adopt this Feasibility Study** and amend existing plans/policies (e.g., ordinances and capital improvement budget) in accordance with the Action Plan.
- **Review and revise**, if necessary, how (and how often) the City of Lumberton coordinates with Division 6 and LRRPO staff to ensure that opportunities for advancing the elements of the Lumberton Loop, including prioritizing in the bi-annual NCDOT prioritization program (SPOT).
- **Update the membership and charter**, if necessary, of the Main Street Advisory Board (or other appropriate body) to steer the Lumberton Loop Project.
- **Continue on a successful path to procuring competitive funding**; part of this strategy must be strengthening/expanding existing partnerships and forging new ones with UNC-Pembroke, non-profit organizations, and private sector stakeholders.
- **Weave the Action Plan strategies into work plans and staff meetings** to ensure that actions can be taken when the situation is favorable, e.g., new development along the route, utility repairs, and branding during event planning.

IMPLEMENTATION PRIORITIES

The table below summarizes several specific actions, partnerships, roles, timeframe for action, and success metrics.

ACTION	SUPPORT	TIMING	SUCCESS
Adopt the Lumberton Loop Feasibility Study	Lumberton City Council and Main Street Advisory Board	Mid-2024	Plan Adoption or Endorsement
Modify the Main Street Advisory Board's membership and charter, if necessary, to include a steering function for the Lumberton Loop	Main Street Advisory Board	2024	Revisions (2) to Main Street Advisory Board Membership & Charter
Update and adopt City plans referencing this project, including Floodprint, Parks & Recreation, Pedestrian, Land Use, Comprehensive, and Downtown Master plans	Input from business / residential owners and private developers	2024-ongoing	Plan Adoption
Update and seek adoption of the Robeson County Comprehensive Transportation Plan to include these segments of the Lumberton Loop	Robeson County, LRRPO, NCDOT Division 6	2024	Plan Adoption
To advance the Lumberton Loop and affiliated projects, add a line item in the City's capital budget statement	Planning Department to coordinate with Budget personnel	Annual	Line Item Added to CIP
Prioritize the Lumberton Loop Project on the Lumber River Rural Planning Organization (LRRPO) Project Needs List	Robeson County, NCDOT Division 6, LRRPO	Annual	Project on LRRPO Project Needs List
Continue to coordinate with NCDOT on the development of current and upcoming projects (e.g., Roberts Ave / NC 211)	NCDOT Division 6	Ongoing; At least twice per year	Meet twice per year
Coordinate with NCDOT on pavement rehabilitation projects that occur along the Loop route	NCDOT Division 6	Ongoing; At least twice per year	Meet twice per year
Work with partners to establish a program of projects along Lumberton Loop to reinforce the route and project, such as cleanup events, public art installations, and fun runs	Friends of Main Street, Rails-to-Trails, Friends of Main Street, Lumberton Area Chamber of Commerce, Healthy Robeson, Robeson History Museum	2024	Adoption of a written work program and a schedule of events
Update and amend the Robeson County Community Health Needs Assessment to include emphasis on walking and Lumberton Loop (and other projects)	Robeson County, University of North Carolina at Pembroke	Every three years	Include text in next plan update

Table 5.1: Implementation priorities.

Implementation Partners

Implementing and maintaining a trail, even one that exists entirely within the public right-of-way, requires coordination with many partnerships. The following is a summary of the primary and supporting partners who are likely to prove vital to the project's design and construction.

PARTNER	ROLE(S)	PLANNING / DESIGN	CONSTRUCTION	MAINTENANCE
City of Lumberton	Project Lead; often Task Lead; funding; labor; coordination, including internal among departments	✓	✓	✓
NCDOT (Central)	Assists with permits and environmental compliance; lead designer	✓	✓	
NCDOT (Division 6)	Assists with design; leads on construction and maintenance; coordination/liaison with local stakeholders	✓	✓	✓
Robeson County	Supports the City of Lumberton; land planning and county-wide connectivity to other trails; coordination with different internal departments in the county	✓		
Lumber River RPO	Updating the Comprehensive Transportation Plan (CTP); coordination with project prioritization	✓		
Private Partners (e.g., Businesses, residents, private developers)	Feedback on design and maintenance concerns, communicating on pending construction; volunteer labor for maintenance activities; volunteer labor for maintenance activities			✓
Non-Profit Organizations (UNC-Pembroke Office for Community & Civic Engagement, Lumbee Tribe of NC)	Funding from federal and foundation funds limited to 501(c)3, university, or tribal organizations; assistance with programming; volunteer labor for maintenance activities	✓		✓
Chamber of Commerce, History Museum, Main Street Advisory Board, Friends of Main St., Healthy Robeson	Local partnerships with advocacy organizations provide coordination support and feedback on design elements, construction-era mitigation strategies; integration with public events connected to the Lumberton Loop Project and route	✓		✓
NC Rails-Trails Conservancy	State-level advocacy organizations provide expert advice on promoting and developing the trail to its maximum potential; alignment with state-level trail objectives and strategies	✓		✓

Table 5.2: Key partners and roles.

Next Steps

What do we do first? How do we get started? Building a complete network from this vision document is a long-term process for both the City of Lumberton and its regional partners.

- [x] **ADOPT THIS PLAN**
- [ ] **SHARE WITH LOCAL, REGIONAL, AND STATE PARTNERS**
- [ ] **START WITH IDENTIFIED HIGH-PRIORITY PROJECTS & LOCATIONS**
- [ ] **IDENTIFY APPROPRIATE GRANTS & LOCAL / REGIONAL PARTNERS**
- [ ] **SECURE LOCAL MATCH COMMITMENTS (10% - 20%)**